Lydd Ranges is a large barrier beach backed by an extensive, relict shingle ridge system. The sandy foreshore is only exposed at low water and increases in elevation west to east, with much of the eastern foreshore rarely exposed. Access to this beach is restricted by the Lydd Ranges firing programme and it can be difficult to programme surveys for suitable times which combine the lowest tides with range closures.

### 1. Introduction

<table>
<thead>
<tr>
<th>Date of survey</th>
<th>16/01/2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason for survey</td>
<td>As requested by the Environment Agency following Storm Brendan which caused strong winds and storm waves between 13/01/2020 and 15/01/2020, scouring the vulnerable clay bund near the western lookout tower.</td>
</tr>
<tr>
<td>Area surveyed</td>
<td>Between Profiles 4c00932 and 4c00940.</td>
</tr>
<tr>
<td>Flood warnings</td>
<td>Flood Alert in force: Coast from Sandgate to Dungeness.</td>
</tr>
<tr>
<td>Summary of beach operations</td>
<td>N/A</td>
</tr>
<tr>
<td>Areas flooded</td>
<td>None</td>
</tr>
</tbody>
</table>

### 2. General Observations - Survey Results

<table>
<thead>
<tr>
<th>General observations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Depletion of beach levels</td>
<td>The western 500m of beach was already low prior to the stormy weather. Previous beach replenishment works to reinstate the beach and bury the clay bund and geotextile bags has been scoured away. Beach levels are the lowest ever recorded.</td>
</tr>
<tr>
<td>Structure condition</td>
<td>The concrete pathway on top of the bund is severely cracked, and there are potential voids beneath the structure. The seaward side of the structure is becoming increasingly undermined, and there is exposed scaffolding.</td>
</tr>
<tr>
<td></td>
<td>There are several locations where the clay has eroded, leaving the seaward edged of the reinforced concrete slabs suspended. The temporary geotextile bags have also been uncovered, and some of this beach material has been washed over onto the concrete pathway.</td>
</tr>
</tbody>
</table>
2.1 Post Storm Profiles

Figure 1 – Cracked pathway on the top of the bund with undermining and exposed scaffolding evident.

Figure 2 – The previously buried geotextile bags have been exposed by the erosion of beach material.
Figure 3 – Beach material has washed over the geotextile bags onto the concrete pathway.

Figure 4 – Profile 4c00935 indicating depleted levels at the foreshore.
Figure 5 – Profile 4c00935 indicating depleted levels at the foreshore.
2.2 Whole Beach CSA

Figure 6 – Trigger Level Chart
3. Hydrodynamics
The Hastings Tide and Wave gauge was only installed in September 2017 and does not yet provide an extensive list of previous storm events. The following tables and graphs are a combination of the Hastings Wave/Tide data, the nearest long term wave data (Pevensey wave buoy) and the nearest tide data (Folkestone). Neither of these are entirely representative of the storm experienced at Lydd Ranges; however they are indicative.

<table>
<thead>
<tr>
<th>Date</th>
<th>Significant wave height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-Dec-2011</td>
<td>4.42</td>
</tr>
<tr>
<td>18-Jan-2007</td>
<td>4.2</td>
</tr>
<tr>
<td>08-Nov-2010</td>
<td>4.13</td>
</tr>
<tr>
<td>03-Dec-2006</td>
<td>4.1</td>
</tr>
<tr>
<td>11-Nov-2010</td>
<td>4.02</td>
</tr>
<tr>
<td>13-Dec-2008</td>
<td>3.97</td>
</tr>
<tr>
<td>15-Jan-2008</td>
<td>3.96</td>
</tr>
<tr>
<td>15-Jan-2015</td>
<td>3.95</td>
</tr>
<tr>
<td>31-Jan-2004</td>
<td>3.92</td>
</tr>
<tr>
<td>10-Mar-2008</td>
<td>3.89</td>
</tr>
</tbody>
</table>

(* Pevensey used because Hastings was only commissioned in 2017)
### Observation Period

<table>
<thead>
<tr>
<th>return</th>
<th>significant wave height (m)</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>2.48</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.02</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3.24</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3.49</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3.65</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3.79</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>3.94</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>4.04</td>
<td>no depth limitations</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>return</th>
<th>significant wave height (m)</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>3.21</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.85</td>
<td>no depth limitations</td>
</tr>
<tr>
<td>2</td>
<td>4.11</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4.43</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>4.63</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>4.82</td>
<td>depth limited at mlws</td>
</tr>
<tr>
<td>50</td>
<td>5.04</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>5.18</td>
<td></td>
</tr>
</tbody>
</table>

(sourced from annual wave report 2018 – pevensey bay from [http://www.channelcoast.org/reports/](http://www.channelcoast.org/reports/))
3.1 Joint Return Periods

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Tidal elevation (mOD)</th>
<th>Hs (m)</th>
<th>Hmax (m)</th>
<th>RP</th>
</tr>
</thead>
<tbody>
<tr>
<td>At time of maximum water elevation</td>
<td>15&lt;sup&gt;th&lt;/sup&gt; January 2020 at 0130hrs.</td>
<td>+4.02</td>
<td>+2.46</td>
<td>+2.89</td>
</tr>
<tr>
<td>At time of highest wave height</td>
<td>15&lt;sup&gt;th&lt;/sup&gt; January 2020 at 0230hrs</td>
<td>+3.78</td>
<td>+2.98</td>
<td>+5.41</td>
</tr>
</tbody>
</table>
3.2 Ambient wave, tide and met conditions

<table>
<thead>
<tr>
<th>Nearest wave buoy</th>
<th>Hastings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave height</td>
<td>Maximum wave height reached: 5.41m on 15th Jan 2020 at 0230hrs. Significant wave height reached: 2.98m on 15th Jan 2020 at 0230hrs.</td>
</tr>
</tbody>
</table>

Wave Direction

- Pevensey Wave Buoy
- Wave direction at time of storm: SSW
<table>
<thead>
<tr>
<th>Nearest tide gauge</th>
<th>Hastings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal range</td>
<td>Measured at: +4.02mOD on 15\textsuperscript{th} Jan 2020 at 0130hrs.</td>
</tr>
</tbody>
</table>

![Graph showing Hastings Pier Tide Height with observed and predicted data points](image-url)